

WHAT IS CLAIMED IS:

1. A thermal printing device, comprising:

a substrate;

an insulation layer on the substrate; and

5 a plurality of microheaters on the insulation layer, wherein two adjacent ones of the microheaters are separated by a trench, and each of the microheaters comprises:

a body having a heating surface; and

two metal wires disposed on two sides of the heating surface of the body,
10 wherein a thermal printing operation is performed by applying a variable voltage or current between the two metal wires in order to heat the microheater to a predetermined temperature.
2. The thermal printing device according to claim 1, further comprising:

a hard coating covering over the microheaters to protect the metal wires and
15 the heating surfaces.
3. The thermal printing device according to claim 1, wherein the substrate and the body are made of a monocrystalline silicon.
4. The thermal printing device according to claim 1, wherein the insulation layer is made of a silicon dioxide.
- 20 5. The thermal printing device according to claim 1, wherein the body has a thickness greater than 10 microns.

6. The thermal printing device according to claim 1, the body has a thickness substantially ranging from 20 to 30 microns.

7. A method for manufacturing a thermal printing device, comprising the steps of:

5 providing a SOI (Silicon on insulator) wafer having a sandwich structure, the SOI wafer is composed of, from bottom to top, a first silicon layer, an insulation layer, and a second silicon layer;

removing a portion of the second silicon layer to form a plurality of trenches and expose a portion of the insulation layer, wherein the second silicon layer is
10 formed into a plurality of bodies of a plurality of microheaters on the insulation layer, and each of the bodies has a heating surface; and

forming two metal wires of each of the microheaters on two sides of the heating surface of each of the bodies, wherein a thermal printing operation is performed by applying a variable voltage or current between the two metal wires
15 in order to heat the microheater to a predetermined temperature.

8. The method according to claim 7, further comprising the steps of:

forming a hard coating on the microheaters so as to protect the metal wires and the heating surfaces.

9. The method according to claim 7, wherein the insulation layer is made of
20 a silicon dioxide.

10. The method according to claim 7, wherein the body has a thickness greater than 10 microns.

11. The method according to claim 7, wherein the body has a thickness substantially ranging from 20 to 30 microns.

12. The method according to claim 7, wherein the step of removing a portion of the second silicon layer is performed by way of ICP (Inductively
5 Coupled Plasma) etching technology.

13. A thermal printing device, comprising:

a substrate having a surface formed with a plurality of grooves;

a plurality of microheaters suspended above the grooves, respectively; and

a covering structure arranged on the substrate and above the microheaters
10 with a gap left between each of the microheaters and the covering structure.

14. The thermal printing device according to claim 13, wherein a material of the substrate is a monocrystalline silicon.

15. The thermal printing device according to claim 13, wherein the grooves are formed by way of silicon anisotropic etching.

16. The thermal printing device according to claim 13, wherein each of the
15 microheaters has a sandwich layer structure comprising, from bottom to top, a dielectric layer, a resistor layer, and a dielectric layer.

17. The thermal printing device according to claim 16, wherein a material of the dielectric layer is selected from one of the group consisting of a silicon
20 dioxide, a silicon nitride and a silicon carbide.

18. The thermal printing device according to claim 13, wherein the covering

structure has a sandwich layer structure comprising, from bottom to top, a silicon dioxide, a silicon nitride and a silicon carbide.

19. The thermal printing device according to claim 13, wherein each of the microheaters is supported by at least one support and suspended above each of the
5 grooves corresponding to each of the microheaters.

20. The thermal printing device according to claim 13, wherein the gap is formed by first defining a sacrificial layer followed by removing the sacrificial layer in a subsequent etching step.

21. A method for manufacturing a thermal printing device, comprising the
10 steps of:

providing a substrate;

forming a plurality of grooves on the substrate;

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forming a microheater above each of the grooves; and

forming a covering structure on the substrate and above the microheaters
15 with a gap left between each of the microheaters and the covering structure, the covering structure covering the microheaters.

22. The method according to claim 21, wherein a material of the substrate is a monocrystalline silicon.

23. The method according to claim 21, wherein the grooves are formed by
20 way of silicon anisotropic etching.

24. The method according to claim 21, wherein each of the microheater has

a sandwich layer structure comprising, from bottom to top, a dielectric layer, a resistor layer, and a dielectric layer.

25. The method according to claim 24, wherein a material of the dielectric layer is selected from one of the group consisting of a silicon dioxide, a silicon
5 nitride and a silicon carbide.

26. The method according to claim 21, wherein the covering structure has a sandwich layer structure comprising, from bottom to top, a silicon dioxide, a silicon nitride and a silicon carbide.

27. The method according to claim 21, wherein each of the microheaters is
10 supported by at least one support and suspended above each of the grooves corresponding to each of the microheaters.

28. The method according to claim 21, wherein the gap is formed by first defining a sacrificial layer followed by removing the sacrificial layer in a subsequent etching step.

15 29. The method according to claim 28, wherein a material of the sacrificial layer is selected from one of the group consisting of a polysilicon, an amorphous silicon and an aluminum metal.